

Remarks:

Reconsideration of the application is requested.

Claims 1-13 remain in the application. Claim 1 has been amended. Claim 13 has been withdrawn.

In item 2 on page 2 of the above-mentioned Office action, claims 1-12 have been rejected as being unpatentable over the disclosed prior art and in further view of Glang et al. (US Pat. No. 4,467,519) under 35 U.S.C. § 103(a).

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references. However, claim 1 has been amended to correct a typographical error.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, inter alia:

doping the predetermined area of the semiconductor blank with the dopant until a concentration of the dopant is at least as high as the target concentration of the second region;

forming a spacer in a self-adjusting manner with respect to an edge of the window such that the spacer defines the first region; and

diffusing the dopant outward from the first region until the concentration of the dopant corresponds to the target concentration of the first region.

The disclosed prior art in combination with Glang et al. teaches doping a semiconductor blank by ion implantation and further diffusing dopant material into a material, e.g. monocrystalline silicon, in order to increase the dopant concentration. In contrast, the invention of the instant application teaches diffusing dopant material out of a material in order to reduce the dopant concentration.

According to the Examiner, however, "the claims taken in their broadest scope do not read on diffusing from the substrate". The Examiner further cites part of claim 1, which states "diffusing the dopant outward from the first region."

Therefore, the Examiner adheres to the opinion set forth in the prior Office Action, i.e., he reads column 6, lines 41-50 of Glang et al.

"A second annealing step is utilized to fully drive in the boron to form the base region and simultaneously therewith drive in the arsenic to form the emitter region of the transistor. This process involving a two-step annealing process for the boron implanting ions is necessary to create a base with sufficient width and doping to avoid punch-through."

as disclosing

"Diffusing the dopant outward from the first region."

However, even if this viewpoint would be accepted for the sake of discussion, claim 1 of the instant application still would be novel and non-obvious over the disclosed prior art and Glang et al.

According to column 6, lines 40-45 of Glang et al., arsenic ions are implanted into the polycrystalline silicon layer 44. Then the annealing step is performed in order to fully drive in the boron in the base region and simultaneously drive in the arsenic in the emitter region.

According to the Examiner's opinion, the "first region" is supposed to be the polyerystalline silicon layer 44 since the dopant is diffused outward therefrom. On page 3 of the Office action, however, the Examiner states:

"...therefore the second region is the polycrystalline silicon layer..."

Thus, it is not clear which layer(s) the Examiner interprets as the first/second region. Therefore, both interpretable possibilities will be discussed below.

1. The "first region" refers to the polyerystalline silicon layer 44

In general, if a dopant is diffused from a region A into a region B, the concentration rate of the dopant in the region B at the beginning of the diffusion process must be smaller than that of the region A. After a sufficient time of performing the diffusion process, it may happen that the concentrations will be the same. However, the concentration of the region B will never be higher than that of the region A.

Applying the above to Glang et al., it can be concluded that the dopant concentration of the polycrystalline silicon layer ("the first region") at all times will be higher than (or equal to, at the most) the concentration of the adjacent layers (base and emitter region) which are subjected to the diffusion process and thereby doped with doping material from "the first region."

Accordingly, the dopant concentration of the "first region" (layer 44) in Glang et al. is higher than that of the "second region" (base and emitter region) at all times. In claim 1 of the instant application, however, it is clearly stated that the process is

"such that a first region of the two adjacent regions has a target concentration of a dopant that is lower than a target concentration of the dopant in a second region of the two adjacent regions...."

Therefore, Glang et al. basically disclose the contrary of the invention of the instant application.

2. The "second region" refers to the polycrystalline silicon layer 44

If the polycrystalline silicon layer 44 is interpreted as the second region, the adjacent regions (base and emitter region) must be interpreted as the first regions according to claim 1 of the present invention. However, Claim 1 of the instant application states:

"...diffusing the dopant outward from the first region..."

Applying the above to Glang et al., this means that the base and emitter region would diffuse the dopant material into the polycrystalline silicon layer 44. This is, however, in clear contradiction to the teaching of Glang et al. which in column 6, lines 41-45 clearly disclose that in an annealing step the dopant is driven from the polycrystalline silicon layer ("the second region") into the emitter region ("the first region").

Accordingly, even if the claims of the instant application are taken in their broadest scope, the subject matter of the invention of the instant application is clearly different from the subject matter of Glang et al. Furthermore, Glang et al. contain no hint that would lead a person skilled in the art in the direction of the invention of the instant application.

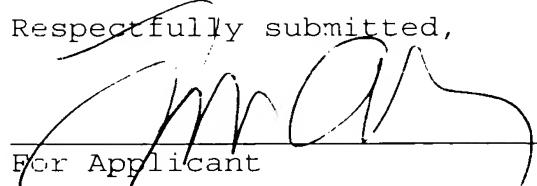
It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is, therefore, believed to be patentable over the art and since all of the dependent claims are ultimately dependent on claim 1, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-12 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate a telephone call so that, if possible, patentable language can be worked out. In the alternative, the entry of the amendment is requested as it is believed to place the application in better condition for appeal, without requiring extension of the field of search.

If an extension of time for this paper is required, petition for extension is herewith made. Please charge any fees which might be due with respect to Sections 1.16 and 1.17 to the Deposit Account of Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,


For Applicant

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